

REMARKS

Extension of Time to Respond

This is in response to the Office Action in the above-identified application dated April 3, 2006. A Petition for a 3-month Extension of Time with the applicable fee accompanies this response.

Pending Claims

Prior to the amendments herein, claims 1-32 were pending in this application. Claim 22 has been canceled, and no claims have been added. Thus, claims 1-21, 23-32 remain. In light of the foregoing amendments and the following remarks, reconsideration of these claims, as amended, is respectfully requested.

Formalities

Non-substantive objections were made to claims 20 and 22. To overcome these objections, claim 20 has been amended to correct the noted typographical error, and claim 22 has been cancelled as being a substantial duplicate of claim 20. Typographical errors have also been noted in claims 10, 12, 18 and 19. Correcting amendments have been made to these claims as well.

Claim Rejections under Section 102

Claims 1-5, 7-11, 14-20, and 22-32 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,394,223 (Lehman). For the reasons given below, applicant's believe that Lehman is ready distinguishable from the subject matter recited in claims 1-5, 7-11, 14-20, and 22-32, and therefore request the this rejection be withdrawn.

The Lehman patent is directed to a loudspeaker and loudspeaker horn having differential energy distribution in the vertical and horizontal planes. The horn of Lehman is comprised of a plurality of elongated throats coupled to an open acoustic waveguide structure, as opposed to a closed horn structure as in applicant's invention, that is, a horn having side walls and end walls. Lehman is not directed to the mitigation of grating lobes; there is no mention of grating lobes in the Lehman disclosure. Furthermore, it is unclear whether the preconditions for grating lobes are even present in the loudspeaker disclosed in Lehman (driver spacing and orientation). Lehman describes his arrangement of throats in an arcuate array (col. 3:48-50). Generally, "arcuate" sources would not produce pure grating lobes.

However, even assuming grating lobes were produced, such lobes would not be suppressed in the manner of the invention due to the open waveguides 15, 19. Such an open structure would allow for unmitigated grating lobes to be projected into the vertical plane, resulting in a loss of available on-axis power.

In formulating his 102 rejection, the examiner states that Lehman teaches a throat end of a horn having an elongated, rectangular throat and aligned coupling chambers. (Action, page 2). The multiple elongated throats of Lehman are denoted by the numerals 14 and 18. These multiple throats are elongated in the direction of the axis of propagation of the sound from the acoustic power sources 13, 17, and do not provide a single throat elongated in the transverse direction as in applicant's invention. Applicant's invention provides for a horn having a single throat end, one that is relatively short (one wavelength or less at high frequencies) in the direction of the horn's propagation axis as opposed to being relatively long as disclosed in Lehman. Unlike Lehman, the acoustic power sources (drivers) of the invention are mounted relatively close to the flared section of the horn. The wide spacing created by this

mounting configuration sets up the precondition for grating lobes (a spacing greater than one wavelength at high frequencies), which are mitigated by the horn's grating lobe mitigation fins.

Claims 1, 11, 17, 25, and 28 have been amended to clarify that the throat end of the loudspeaker horn of the invention is relatively short (in the direction of the propagation axis), and that the aligned acoustic power sources are mounted to this relatively short throat end. In Lehman, the drivers are mounted at a location remote from the flared waveguides 15, 19, and the multiple throats 14, 18 through which the drivers 13, 17 couple acoustic power to the flared waveguides are extremely long.

Claims 11 and 17 have additionally been amended to clarify that the throat end of the horn recited in these claims is elongated in the transverse direction, and not in the direction of the horn's propagation axis.

In sum, Lehman does not disclose a loudspeaker horn comprised of a relatively short throat end for receiving acoustic power from aligned and widely spaced (more than one wavelength at the highest operating frequency) acoustic power sources mounted thereto, a precondition for generating grating lobes. Nor does Lehman disclose a loudspeaker horn having a flared section extending from such a throat end, which has both flared sidewalls and end walls extending from the throat of the horn as needed for grating lobe mitigation. Thus, Lehman does not disclose to place fins of any sort in the flared section of a horn between the horn's end walls, as required by claims 1-5, 7-11, 14-20, and 22-32. As above mentioned, Lehman discloses an open waveguide structure without end walls.

Claims Rejections under Section 103(a)

Claims 6 and 21 further stand rejected under 35 U.S.C. 103(a) as being unpatentably obvious over Lehman in view of U.S. Patent No. 4,845,759 (Danley). The examiner

acknowledges that Lehman fails to disclose the size of the coupling chambers of the horn recited in claims 6 and 21, namely, in the order of one wavelength or smaller at the highest operating frequency of the loudspeaker. The examiner, however, contends that Danley supplies this missing disclosure.

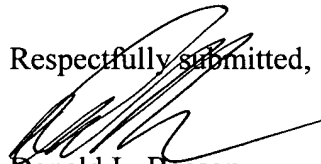
It is first noted that the Danley reference does not disclose or teach how to size a coupling chamber of a horn, but rather Danley speaks to the sizing of the “sound radiating portion of each driver” in a line array of drivers. Further, Danley teaches the size of the radiating portion of the driver as being effectively less than one to several wavelengths, whereas claims 6 and 21 recite that the size of each of the coupling chambers of the horn is in the order of one wavelength or smaller at the highest operating frequency of the loudspeaker. Importantly, Danley does not address grating lobes or the preconditions for grating lobes, or to provide a closed horn structure with grating lobe mitigation fins, as claimed in the required by claims 6 and 12.

Claims 12 and 13 also stand rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman in view of U.S. Patent No. 6,016,359 (Gunness). The examiner cites Gunness as disclosing a mounting surface having aligned, circular openings associated with coupling chambers for mounting multiple circular acoustic power sources to the throat end of a horn in aligned relation with the horn’s elongated, rectangular throat opening. Gunness discloses to mount drivers to an interior wall of a loudspeaker cabinet and further discloses to acoustically couple the drivers mounted to the interior cabinet wall to corresponding horns on the opposite side of the wall. Gunness does not disclose or suggest a horn having a throat end which includes a mounting surface, or aligned circular openings in such a mounting surface, which are associated with coupling chambers in the throat end of the horn. Gunness also does not

teach or suggest a flared section extending from the horn's throat end, which has grating lobe mitigation fins disposed therein that extend in planes substantially perpendicular to the long dimension of the throat for a substantial distance toward the mouth end of the flared section for mitigating grating lobes produced by widely spaced and aligned acoustic power sources mounted to the horn's mounting surface. As in Lehman and Danley, Gunness does not address the need to mitigate grating lobes caused by widely spaced drivers, or preconditions for generating grating lobes.

In view of the foregoing amendments and remarks, it is believed that the claims of the present application, as amended, are in condition for allowance, a request for which is hereby respectfully made.

Respectfully submitted,



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